

## **RESOURCE GUIDE ADDENDUM: LAKE COUNTY RECOMMENDATIONS**

### **WILDLIFE PROVISIONS FOR WIND ENERGY FACILITIES**

#### **Wildlife Protection**

Lake County is home to more endangered and threatened species than any other county in Illinois. We also have a greater number of natural areas, considerable Lake Michigan shoreline, and many inland lakes, rivers and wetlands, all of which concentrate resident and migrating wildlife within Lake County.

Wind Energy Systems over 75 feet in height could easily impact bird and bat migratory patterns, since they are taller than the tree canopy.

Taking the proximity to conservation lands, key habitats, and migratory patterns into account, when siting Wind Energy Systems, is an important way to mitigate impacts on birds and bats. Consultation with environmental agencies, environmental studies and the development of an Environmental Plan provide an effective means of avoiding unnecessary impacts.

#### **Structural Considerations**

To reduce potential bird perching and nesting, towers should consist of enclosed tubular structures with pointed tops (unless other mitigation strategies are employed), rather than lattice structures. External platforms and ladders should not be permitted on towers, without appropriate mitigation, as determined in the Conditional Use Permit.

To reduce potential wildlife impacts, the facility should employ only red, or dual red and white strobe, strobe-like, or flashing lights, not steady burning lights to meet FAA requirements for visibility lighting of wind turbines, permanent meteorological towers, and communication towers.

#### **Consultation with Environmental Agencies**

For proposed wind facilities, over 75 feet in height or in proximity to important natural resources, the Lake County jurisdiction must consult with the Illinois Department of Natural Resources and U.S. Fish and Wildlife Service on proposals in accordance with applicable statutes.

Before developing the site plan, applicants for Wind Energy Facilities are encouraged to initiate natural resource reviews with the Illinois Department of Natural Resources and U.S. Fish and Wildlife Service in order to identify potential environmental issues.

The Illinois Department of Natural Resources and U.S. Fish and Wildlife Service may request a wildlife study evaluating the potential impact of the proposed construction and operation of a large wind energy facility on any species of concern or high quality wildlife habitat on or near the subject property.

For small turbines proposed with a height of over 75 feet, within 1.5 miles of Lake County Forest Preserve District, Illinois State Park, Illinois Nature Preserve, or Illinois

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Natural Area Inventory lands, the Lake County jurisdiction should provide notice to and solicit comments from the appropriate agency(ies).

### **Environmental Studies and Plan for Large Wind Energy Facilities**

- 1) Applicants may be required to provide a preliminary environmental report that identifies the current ecological resources found on, near, and within 1.5 miles of the proposed project area as prepared by a qualified wildlife biologist, including:
  - a. Natural Resource Inventory of the proposed large wind facility area, completed by the Lake County Soil and Water Conservation District.
  - b. A map of the natural resources on the subject property including: streams, ponds, wetlands, grasslands and forests.
  - c. A map of the environmental resources in the surrounding area within 1.5 miles of the proposed facility, including but not limited to: rivers, lakes, high quality wetlands, Important Bird Areas and Illinois Nature Preserve, Illinois State Park, Illinois Natural Areas Inventory, and Forest Preserve District lands.
  - d. Research from conservation agencies and organizations regarding the presence of species of concern in the area of the property.
  - e. Results from three on-site evaluations (spring, summer, fall) to the proposed project area by a qualified wildlife biologist to evaluate current wildlife occurrences and vegetation/habitat coverage. At least one visit should be conducted during dusk to determine the presence of bat species.
- 2) Given concerns about any impact on species of concern, applicants may be required further detailed assessment, using guidelines established by the US Fish and Wildlife Service and other considerations deemed relevant by Planning, Building and Development.
- 3) Applicants may be required to develop and implement an environmental plan that adequately mitigates or eliminates any potentially adverse impacts, identified through consultations, comments from noticed parties, and environmental studies. The environmental plan may require the monitoring of impact on wildlife through on-site data collection before, during and after construction and operation of the large wind facility.
- 4) The submitted site plan may need to be revised due to findings of the environmental plan.

### **Environmental Studies and Plan for Small Wind Energy Facilities**

Applicants may be required to develop and implement an environmental plan that adequately mitigates or eliminates any potentially adverse impacts, identified through consultations, comments from noticed parties, and environmental studies.

## SOUND LEVEL MEASUREMENT INSTRUCTIONS AND WORKSHEET LAKE COUNTY

The **Sound Measurement Worksheet** is intended to determine the average sound level (i.e. **Source Sound Level**) from operating wind energy facilities by correcting for the ambient sound levels. This measurement will determine whether the sound exceeds the limits stipulated in Section 6.3 for large wind facilities and Section 6.4 for small wind facilities of the Lake County Unified Development Ordinance.

**Sound Level Meters** (SLM) must meet the Type 2 grade or better per the latest revision of ANSI S1.4 *American National Standard Specification for Sound Level Meters* and must have an integrating feature that meets ANSI S1.43 *American National Standard Specifications for Integrating Averaging Sound Level Meters*.

The **procedures** outlined here are based in essence on applicable portions of ANSI S12.9 *American National Standard Quantities and Procedures for Description and Measurement of Environmental Sound* and Part 910 of Title 35: Environmental Protection, Subtitle H: Noise, Chapter 1: Illinois Pollution Control Board.

### Frequency Measurement

- The A-weighted scale is most often utilized for the measurement of tonal or audible sound levels. These are sounds that range from 20 to 20,000 Hz. and that the human ear can typically hear.
- The C-weighted scale is utilized especially for measurement of low frequency sound, i.e. more bass tones or infrasound, which may or may not be audible to the human ear. Low frequency sounds can travel farther and may be enhanced in different locations such as in buildings.

### Instrumentation Set-Up:

- Ensure the battery is in good condition.
- Ensure that the Sound Level Meter is calibrated according to manufacturer's instructions.
- Measurements may be taken at any location on a nonparticipating property, provided the location is not within:
  - 5 feet of small surfaces (e.g., trees, posts, etc),
  - 25 feet of a large reflective surface (e.g., shed, building, etc), or
  - 50 feet of a large reflective surface if the sound is tonal in nature.
- A tripod for the microphone or SLM is required if the sound is high-pitched. If the sound is low frequency in nature, a hand-held meter is acceptable as long as the arm is extended.
- The microphone on the SLM must be aimed toward the noise source and oriented at an angle recommended by the manufacturer (usually 45-70° off the ground).

### Sound Level Limit Regulations for Wind Energy Facilities:

- The average sound level from wind facilities shall not exceed fifty-five (55) dB(A) during daytime hours or forty-five(45) dB(A) during nighttime hours at any point within neighboring, residentially zoned or used property. The different limits for daytime and nighttime sound levels are consistent with standards established by the Illinois Pollution Control Board. These sound level limits on residential properties are stricter than those established by the Illinois Pollution Control Board, because of the typical tonal, modulating and/or bass sounds experienced with wind facilities. The average sound level from wind facilities shall not exceed sixty-five (65) dB(A) on neighboring industrial properties and sixty (60) dB(A) on other neighboring nonresidential properties, at any time of the day.

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- No wind facility shall operate with an average sound level that is more than 5 dB(A) above the non-operational ambient level, as measured within 100 ft. of any residential dwelling on a neighboring property.
- To limit the level of low-frequency sound, the average C-weighted sound level during wind facility operation shall not exceed the A-weighted ambient sound level by more than twenty (20) dB.

### Large Wind Facilities

The Applicant shall provide Financial Assurance (i.e. letter of credit or performance bond) satisfactory to the Lake County State's Attorney, secured by the owner for the purpose of contracting a professional sound level measurement, as deemed necessary, during the first two years of operation.

### WORKSHEET INSTRUCTIONS

#### Source and Receiver Location:

Identify the types of property from which the sound is coming (Source) and on which the sound is being measured (Receiver).

#### Nature of Sound:

Identify what is the Source of the sound being measured.

#### Weather Conditions:

- Measurements should not be made when ground level winds exceed 10 mph.
- Use an anemometer and compass to measure **wind speed** and **direction** and identify them on the Worksheet.
- Use a thermometer to determine **temperature** and a hygrometer to measure **relative humidity** to identify any adverse conditions. All instruments must be used in accordance with the manufacturer's recommended procedures.
- As an alternative, weather conditions can be obtained from an airport or weather station reporting local conditions through an internet site.

#### Equipment:

Identify the type of sound level meter being used and whether measurements will be using the A-weighted scale to measure tonal or audible sound (20 to 20,000 Hz) or the C-weighted scale to measure low frequency sound (Below 200 Hz).

#### Calibration Check:

Follow manufacturer's instructions to ensure that the Sound Level Meter is properly calibrated. Place the calibrator on the SLM microphone and adjust the meter as necessary so that it displays the rated output of the calibrator (usually 94.0 dB). This must be repeated before and after each series of measurements to ensure SLM stability.

#### Measured Sound Levels:

1. **Total Sound Level:** Collect a 1-2 minute sample of the sound with the wind energy facilities operating. Wait at least one minute collect a second sample. If the samples are within 2 dB, there is repeatability and the two levels can be averaged for a total sound level. If there is more than a 2 dB difference, repeated samples should be taken to determine which levels are most in common and can be averaged. This is repeated for the C scale if low frequency sound is a concern.
2. **Ambient Sound Level:** Ambient Sound represents the background sound level observed when the source is not operating. Collect a 10-15 second sample of the Ambient Sound during a period when there are no nearby distinct or prominent sounds,

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such as dogs barking, a plane flying over, or a car passing by. Wait over one minute to collect a second sample. If the samples are within 2 dB, there is repeatability and the two levels can be averaged. This is repeated for the C scale if low frequency sound is a concern.

3. **Correction:** This figure calculates how to correct the Total Sound Level measurement for Ambient Sound.
  - a. Enter the difference between the Total and Ambient Sound Levels [Line 1 – Line 2]
  - b. If the Ambient sound is not at least 2 dB lower than the Total Level on 3a, a determination of violation cannot be made. If the difference is 2 dB enter a “4”; for a difference of 3, enter a “3”; for a difference of 4-5, enter a “2”; for a difference of 6-9, enter a “1”; and for a difference of 10 or more, enter a “0.”
4. **Source Sound Level:** The average sound level from the operating Wind Energy System (Source) is the Total Sound Level minus the Correction factor. [Line 4 = Line 1 – Line 3b]
5. **Increase above Ambient Sound:** An A-weighted sound level from a sound source that is more than 5 dB above the ambient level represents a significant increase in noise and is an objective indicator of annoyance. This is the difference between Line 4 and Line 2 and is used to assess compliance with the noise ordinance on residential properties. This measurement is intended for use on neighboring properties and should only be taken within 100 feet of a residential dwelling.
6. **Low Frequency Measurement** (if indicated): Low frequency sound can impact neighbors over a longer distance than more tonal sounds and is possibly perceived indoors. A C-weighted sound level with the turbine(s) operating that is more than 20 dB above the A-weighted ambient sound level is an objective indicator of annoyance due to a significant increase in low frequency noise. If the difference between the C-weighted level of Line 4 and the A-weighted level of Line 2 is less than 20 then Wind Energy System is considered to be in compliance with the noise ordinance.

**NOTE:** The 5 dB(A) penalty for adverse character sound in the original version of the Sound Level Measurement worksheet from the Wind Energy Task Force of Lake County Communities has been removed by the Lake County Regional Planning Commission for being difficult to enforce.

# SOUND LEVEL MEASUREMENT INSTRUCTIONS AND WORKSHEET LAKE COUNTY

Source Property:

Receiving Property:

|                 |                    |                |
|-----------------|--------------------|----------------|
| ___ Residential | ___ Nonresidential | ___ Industrial |
| ___ Residential | ___ Nonresidential | ___ Industrial |

Nature of Sound:

Location of instruments:

Wind Speed and Direction:

Equipment:

Date:

Time:

Examiner:

## Calibration Check:

Sound level with calibrator in place:

| Before   | Cal. Level | After    |
|----------|------------|----------|
| _____ dB | 94.0 dB    | _____ dB |

## Measured Sound Levels:

1 **Total Sound Level** (*source on*):

| Sample 1    | Sample 2    | Average     |
|-------------|-------------|-------------|
| _____ dB(A) | _____ dB(A) | _____ dB(A) |
| _____ dB(C) | _____ dB(C) | _____ dB(C) |

2 **Ambient Sound Level** (*quiescent level with source off*):

|             |             |             |
|-------------|-------------|-------------|
| _____ dB(A) | _____ dB(A) | _____ dB(A) |
| _____ dB(C) | _____ dB(C) | _____ dB(C) |

3 **Correction** for the ambient background sound

3a. Enter the difference between lines 1 and 2:

|             |             |
|-------------|-------------|
| _____ dB(C) | _____ dB(A) |
|-------------|-------------|

*If Line 3a = 0 or 1 dB the source level cannot be determined*

3b. If Line 3a = 2 dB → **enter 4 dB**;      3 dB → **enter 3 dB**  
       = 4-5 dB → **enter 2 dB**;      6-9 dB → **enter 1 dB**  
       = 10 dB or more → **enter 0 dB**

|             |             |
|-------------|-------------|
| _____ dB(C) | _____ dB(A) |
|-------------|-------------|

4 **Source Sound Level** (*line 1 minus line 3b*):

|             |             |
|-------------|-------------|
| _____ dB(C) | _____ dB(A) |
|-------------|-------------|

5 **Increase Above Ambient Sound** (*A-wtd level in line 4 minus A-wtd level in line 2*):

|             |
|-------------|
| _____ dB(A) |
|-------------|

Measured within 100 ft of residential dwelling

6 **Low Frequency** =  $C_{\text{source}} - A_{\text{ambient}}$  (*C-wtd level of line 4 minus A-wtd level of line 2*):

|          |
|----------|
| _____ dB |
|----------|

## Sound Limits (dB) on Receiving Properties:

|  | Industrial | Nonresidential | Residential<br>Day / Night |
|--|------------|----------------|----------------------------|
| Source Sound Level (A-wtd) - Line 4                              | 65         | 60             | 55 / 45                    |
| Increase Above Ambient Sound (A-wtd) - Line 5                    |            |                | 5                          |
| Low Frequency, $C_{\text{source}} - A_{\text{ambient}}$ - Line 6 | 20         | 20             | 20                         |